MITSUBISHI

A1SJ61BT11 Control & Communication Link System

Master/Local Module

MITSUBISHI

General-Purpose PROGRAMMABLE CONTROLLER

User's Manual (Hardware)

Thank you for buying the Mitsubishi general-purpose programmable controller A Series.

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MODEL	A1SJ61BT11-U-H-E
MODEL Number	13J876

IB-66725-F (0709) MEE

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● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.
These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PLC system safety precautions.
These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

⚠DANGER	**Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.**
⚠CAUTION	**Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.**

Depending on circumstances, procedures indicated by ⚠**CAUTION** may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠DANGER

- Read Chapter 5 in this manual carefully for status of each station when the PLC CPU has stopped its operation and when a communication error occurred in the data link. Configure an interlocking circuit in a sequence program using the communication status information (SB, SW) so that the safety of the overall system is always maintained.
  Accident may occur due to output error or malfunctioning.
- The master station or local station cannot detect errors when a station specified as an error-invalidated station becomes communication error.

⚠CAUTION

- Do not bundle, on install, the control cables and communication cables with , or near, main circuit and power cables. Keep them at least 100 mm (3.9 in.) away from such cables. Noise may cause erroneous operation.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Use the PLC in the environment given in the general specifications section of this manual. Using the PLC outside the range of the general specifications may result in electric shock, fire or erroneous operation or may damage or degrade the product.
- Insert the tabs at the bottom of the module into the holes in the base unit before installing the module. Improper installation may cause erroneous operation, accidents, or the module to fall out.
- Do not touch the electronic parts or the module conduction area. It may cause erroneous operation or failure.

[WIRING PRECAUTIONS]

⚠DANGER

- Before beginning any installation or wiring work, make sure all phases of the power supply have been obstructed from the outside. Failing to completely shut out the power supply phases could cause electrical shock and/or damage to the product.
- Following installation or wiring work, when turning on the power supply and operating the equipment, make sure the terminal cover provided as an accessory has been attached to the product.
  Failure to attach the terminal covers may result in malfunction.

⚠CAUTION

- Tighten the terminal screws to the specified torque. Loose terminal screws may cause a short circuit or erroneous operation.
- Be sure that cuttings, wire chips, or other foreign matter do not enter the module. Foreign matter may start a fire or cause an accident or erroneous operation.
- Be sure that the communication cable connected to the module is kept in the duct or is fixed with cramps.
  Failure to do so may cause a damage to the module or cables due to dangling, shifting or inadvertent handling of cable, or malfunction because of bad cable contacts.
- Do not grab on the cable when removing the communication cable connected to the module. When removing the cable with a connector, hold the connector on the side that is connected to the module.
  When removing the cable without a connector, loose the screws on the side that is connected to the module.
  Pulling the cable that is still connected to the module may cause malfunction due to bad cable contacts.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠DANGER

- Do not touch terminals without obstructing all power supply from the outside. It may cause malfunction.
- Turn off the power before cleaning the module or retightening the screws. Doing this work while the power is on may damage the module or cause erroneous operation.
- Do not disassemble or rebuild the module. It may cause accidents, erroneous operation, injury, or fire.
- Turn off the power before mounting and dismounting the module. Mounting or dismounting the module while the power is on may damage the module or cause erroneous operation.

[DISPOSAL PRECAUTIONS]

⚠CAUTION

- When disposing of this product, handle it as industrial waste.

About This Manual

The following product are available for this equipment. Refer to the table given below to choose suitable manuals.

Related Manual

Manual Name	Manual No. (Model code)
AJ61BT11/A1SJ61BT11 Control & Communication Link System Master/Local Module User's Manual	IB-66721 (13J872)

Correspondence to EMC DIRECTIVE

To make the PLCs compliant with the EMC directive, refer to Chapter 3 "EMC AND LOW-VOLTAGE DIRECTIVE" in the PLC user's manual (Hardware).

* When the PLC CPU user's manual (Hardware) does not include Chapter 3 "EMC AND LOW-VOLTAGE DIRECTIVE", refer to QnA Series CPU Compatible High-Speed Access Basic Base Unit -- Additional Explanation for Product Conforming to EMC Standards (IB-68837) (optional).

1. Overview

This manual describes the specification, name of each part, settings, etc., of the A1SJ61BT11 Control & Communication Link System Master/Local Module (abbreviated as A1SJ61BT11 hereafter) to be used in combination with the MELSEC-A series PLC CPU.

In this manual, Control & Communication Link is abbreviated as CC-Link.

Confirm if the following items are included in the package.

Item name	Number of items
A1SJ61BT11 main module	1
Terminal resistor 110Ω 1/2W (Brown-brown-brown)	2
Terminal resistor 130Ω 1/2W (Brown-orange-brown)	2

2. Performance Specification

2.1 Performance specifications

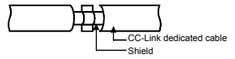
The following shows the performance specifications of the A1SJ61BT11.
Refer to CPU module User's Manual to be used for general specification of A1SJ61BT11.

Item	Specification
Transmission speed	156kbps/625kbps/2.5Mbps/5Mbps/10Mbps selectable
Maximum overall cable distance	It differs depending on transmission speed (Refer to Section 2.1.1)
Maximum number of modules that can be connected (when master station)	64 units However, the following conditions must be met: $\{(1 \times a) + (2 \times b) + (3 \times c) + (4 \times d)\} \leq 64$ a: The number of occupied modules by station 1. b: The number of occupied modules by station 2. c: The number of occupied modules by station 3. d: The number of occupied modules by station 4. $\{(16 \times A) + (54 \times B) + (88 \times C)\} \leq 2304$ A: Remote I/O station's numbers ≤ 64 B: Remote device station's numbers ≤ 42 C: Local station's ,standby master station's and intelligent device station's numbers ≤ 26
Number of occupied stations (When local station)	1 station or 4 stations (Switched by DIP switch)
Maximum link points per system	Remote I/O (RX, RY): 2048 points Remote register (RWw): 256 points (master station → remote/local station) Remote register (RWr): 256 points (remote/local station → master station)
Link point per remote station/local station	Remote I/O (RX, RY): 32 points (local station 30 points) Remote register (RWw): 4 points (master station → remote/local station) Remote register (RWr): 4 points (remote/local station → master station)
Communication method	Poring method
Synchronous method	Frame synchronous method
Signed method	NRZI method
Transmission path	Bus (RS-485)
Transmission format	Conform to HDLC
Error control system	CRC ($X^{16}+X^{12}+X^5+1$)
Cable	CC-Link dedicated cable/CC-Link dedicated high-performance cable*
RAS function	• Auto return function • Slave station cutoff function • Link special relay/Error detection by register
Parameter entry numbers for E^2PROM	10000 times
I/O occupied points number	32 points (I/O allocation: special 32 points)
Internal consumption current (5VDC) (A)	0.4
Weight [kg]	0.25

* The CC-Link dedicated cable and CC-Link dedicated high-performance cable cannot be used together.
Also attach the terminator which matches the kind of the cable.

Please observe the following precautions when using the CC-Link dedicated cable.

(1) Be sure to ground the cable shield that is connected to the CC-Link module close to the exit of control panel or to any of the CC-Link stations within 30 cm (11.8 in.) from the module or stations. The CC-Link dedicated cable is a shielded cable. As shown in the illustration below, remove a portion of the outer covering and ground as large a surface area of the exposed shield part as possible.



(2) Always use the specified CC-Link dedicated cable.
(3) Do not use a ferrite core for the CC-Link module or CC-Link stations.
(4) The CC-Link module, the CC-Link stations and the FG line inside the control panel should be connected at both the FG terminal and the SLD terminal as shown in the diagram below.

2.1.1 Maximum overall cable distance

The maximum overall cable distance varies depending on the transmission speed.

The relationship between the transmission speed and the maximum overall cable distance is indicated below.

(1) When the system is configured with remote I/O stations/remote device stations only

*1 The cable length between remote I/O stations or remote device stations
*2 The cable length between the master station and its adjacent stations

CC-Link dedicated cable (terminal resistor of 110 Ω used)

Transmission speed	Cable length between station and station		Maximum overall cable distance
	*1	*2	
156 kbps	30 cm (11.8 in.) or longer	1 m (3.3 ft.) or longer	1200 m (3937.2 ft.)
625 kbps			600 m (1968.6 ft.)
2.5 Mbps			200 m (656.2 ft.)
5 Mbps	30 cm (11.8 in.) to 59 cm (23.2 in.) *		110 m (360.9 ft.)
	60 cm (23.6 in.) or longer		150 m (492.2 ft.)
10 Mbps	30 cm (11.8 in.) to 59 cm (23.2 in.) *		50 m (164.1 ft.)
	60 cm (23.6 in.) to 99 cm (39 in.)*		80 m (262.5 ft.)
	1 m (3.3 ft.) or longer		100 m (328.1 ft.)

CC-Link dedicated high-performance cable (terminal resistor of 130 Ω used)

Transmission speed		Cable length between station and station		Maximum overall cable distance
		*1	*2	
156 kbps		30 cm (11.8 in.) or longer	1 m (3.3 ft.) or longer	1200 m (3937.2 ft.)
625 kbps				900 m (2952.9 ft.)
2.5 Mbps				400 m (1312.4 ft.)
5 Mbps				160 m (524.9 ft.)
10 Mbps	Number of connected units: 1 to 32 units			100 m (328.1 ft.)
	Number of connected units: 33 to 48 units	30 cm (11.8 in.) to 39 cm (15.4 in.) *		80 m (262.5 ft.)
		40 cm (15.8 in.) or longer		100 m (328.1 ft.)
	Number of connected units: 49 to 64 units	30 cm (11.8 in.) to 39 cm (15.4 in.) *		20 m (65.6 ft.)
		40 cm (15.8 in.) to 69 cm (27.2 in.) *		30 m (98.4 ft.)
		70 cm (27.6 in.) or longer		100 m (328.1 ft.)

*: If the cable length between remote I/O stations or remote device stations is wired with a length in this range at even one location, then the maximum overall cable distance shown above applies .

(2) When the system is configured with remote I/O stations/remote device stations/local stations or intelligent device stations

*1 The cable length between remote I/O stations or remote device stations
*2 The cable length between the master/local station or intelligent device station and its adjacent stations

CC-Link dedicated cable (terminal resistor of 110 Ω used)

Transmission speed	Cable length between station and station		Maximum overall cable distance
	*1	*2	
156 kbps	30 cm (11.8 in.) or longer	2 m (6.6 ft.) or longer	1200 m (3937.2 ft.)
625 kbps			600 m (1968.6 ft.)
2.5 Mbps			200 m (656.2 ft.)
5 Mbps	30 cm (11.8 in.) to 59 cm (23.2 in.) *		110 m (360.9 ft.)
	60 cm (23.6 in.) or longer		150 m (492.2 ft.)
10 Mbps	30 cm (11.8 in.) to 59 cm (23.2 in.) *		50 m (164.1 ft.)
	60 cm (23.6 in.) to 99 cm (39 in.)*		80 m (262.5 ft)
	1 m (3.3 ft.) or longer		100 m (328.1 ft)

CC-Link dedicated high-performance cable (terminal resistor of 130 Ω used)

Transmission speed	Cable length between station and station		Maximum overall cable distance
	*1	*2	
156 kbps	30 cm (11.8 in.) or longer	2 m (6.6 ft.) or longer	1200 m (3937.2 ft.)
625 kbps			600 m (1968.6 ft.)
2.5 Mbps			200 m (656.2 ft.)
5 Mbps	30 cm (11.8 in.) to 59 cm (23.2 in.) *		110 m (360.9 ft.)
	60 cm (23.6 in.) or longer		150 m (492.2 ft.)
10 Mbps	70 cm (27.6 in.) to 99 cm (39 in.) *		50 m (164.1 ft.)
	1 m (3.3 ft.) or longer		80 m (262.5 ft)

*: If the cable length between remote I/O stations or remote device stations is wired with a length in this range at even one location, then the maximum overall cable distance shown above applies .

2.2 CC-Link dedicated cable

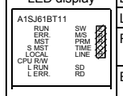
Use the CC-Link dedicated cables in a CC-Link system. If cables other than CC-Link dedicated cables are used, performance of the CC-Link system cannot be guaranteed.

CC-Link dedicated cable

For the specifications of the CC-Link dedicated cable and the point of inquiry, refer to the CC-Link and the catalog L-74108143E.

3. Name and Setting of Each Component

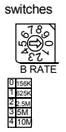
This section explains the name and setting of each A1SJ61BT11 component.

Number	Name	Description
(1)	LED display 	Data link status can be confirmed by LED's ON state.

LED display		Description
RUN		ON: When module is normal. OFF: When watchdog timer error.
ERR.		ON: All stations communication error. Blink: Communication error occurred in the station.
MST		ON: It is set at the master station.
S MST		ON: It is set at the standby master station.
LOCAL		ON: It is set at the local station.
CPU R/W		ON: It is communicating with PLC CPU. (FROM/TO)
E R R O R	SW	ON: Settings for switches are not normal.
	M/S	ON: Master station is overlapped on the same line.
	PRM	ON: An error occurred in the parameter content.
	TIME	ON: Data link monitor timer is started.
	LINE	ON Cables are disconnected or transmission path is affected by noise, etc.
L RUN		ON: Data link is operating. (host station)
L ERR.		ON: Communication error (host station). Blink: The settings of switches 2 to 5 are changed during the power supply ON.
SD		ON: Data being sent.
RD		ON: Data being received.

Number	Name	Description
(2)	Station number setting switch STATION NO. 	Set the module station number.(Setting status when shipped: 0) <Setting range> • When remote net mode Master station: 0 Local station: 1 to 64 When set to a number not in the range 0 to 64, the "SW" and "L ERR." LEDs are turned on. • When remote I/O net mode Master station: 1 to 64 (set last station number of remote I/O station) When set to 0, the "PLM" LED is turned on.
(3)	Mode setting switches MODE 	Set the operation status of the module (Setting status when shipped: 0)

Number	Names
0	Online (remote net mode)
1	Online (remote I/O net mode)
2	Offline
3	Line test 1 *1
4	Line test 2 *1
5	Parameter confirmation test *1
6	Hardware test
7	Setting error ("SW" LED turn on)
8 to A	Setting prohibited due to internal use
B to F	Setting error ("SW" LED turn on)

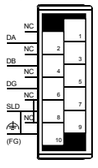
(4)	Transmission speed setting switches 	Set transmission status of the module (Setting status when shipped: 0)

Number	Descriptions
0	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps
5 to 9	Setting error ("SW" or "L ERR" LED turn on)

*1: Use impossible at local station.

Number	Name	Description
(5)	Condition setting switches 	Set the operation condition (Setting status when shipped: SW1to 7 are OFF, SW8 is ON)

Number	Setting contents	Switches condition OFF	Switches condition ON
SW1	Station type	Master / Local station	Standby master station
SW2	—	Always OFF	
SW3	—	Always OFF	
SW4	Input data status of the data link error station	Clear	Retention
SW5	Number of occupied station	1 station	4 station
SW6	—	Always OFF	
SW7	—	Always OFF	
SW8	Module mode	Intelligent mode	I/O mode

(6)	Terminal block 	Connecting the CC-Link dedicated cable of data link. The terminals showing below are connected inside the module. • SLD (Terminal No. 8) and FG (Terminal No. 10) • NC (Terminal No. 7) and NC (Terminal No. 9) 2-piece type terminal block. The module can be exchanged with another without removing the signal lines from the terminal block.

Point

(1) When the module is operated in synchronous mode, there may be occasions when the "L RUN" LED is only faintly lit.

(2) The setting contents for the switches (2) to (5) are valid when the module power supply status is OFF ➔ ON.
When the setting contents are changed while the module power supply is ON, reset PLC CPU or turning the module power supply ON to OFF again

Important

In a system in which the standby master station is present, do not use station number 64 for stations other than the standby master station. If a different station is assigned to station number 64, it cannot perform communication correctly.

4. Loading and Installation

The following is explanations of the handling precautions and installation environment which is common to modules when handling A1SJ61BT11 from unpacking to installation.

For the details of loading and installation of the module, refer to User's Manual of PLC CPU module to be used.

4.1 Handling precautions

The following is an explanation of handling precautions of the module.

1) Because the case of the module is made of resin, be careful not to drop it or expose it to strong impact.
2) Execute tightening of the module's installation screws within the range indicated below.

Screw location	Tightening torque range
Module installation screws (M4 screws)	78 to 118N·cm
Terminal-block terminal screws (M3.5 screws)	59 to 88N·cm
Terminal-block installation screws (M3.5 screws)	49 to 78N·cm

Point

Always turn the power of the corresponding station OFF before mounting or removing the terminal block. If the terminal bolck is mounted or removed without turning the corresponding station's power OFF, correct data transmission by the mounted or removed station will not be guaranteed.

4.2 Installation environment

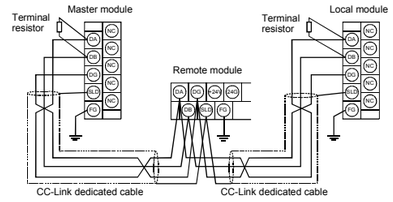
For more details on the installation environment, refer to the user's manual for the PLC CPU module used.

5. External Wiring

5.1 Wiring the CC-Link dedicated cable

The connection method of the CC-Link dedicated cables for the master module, local module, standby master module, remote module and intelligent module are described.

1) Connections can be made regardless of the station numbers.
2) Always connect "terminal resistors" supplied with the module to the modules at both ends and between "DA" and "DB".
3) In the CC-Link system, the terminal resistor that is connected differs depending on the cable used.
   - When the CC-Link dedicated cable is used:
     110Ω 1/2W (brown-brown-brown)
   - When the CC-Link dedicated high-performance cable is used:
     130Ω 1/2W (brown-orange-brown)
4) The master module can be connected besides to the ends.
5) A star connection cannot be used.
6) The connection method is shown below.



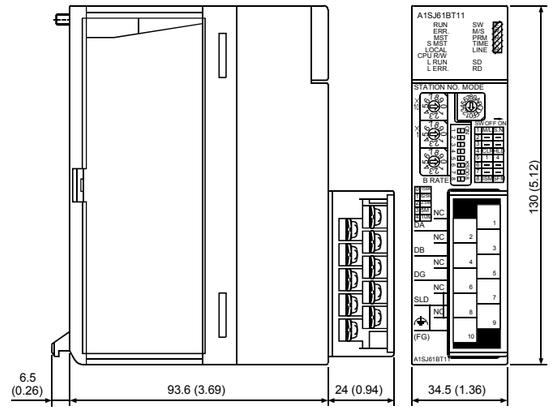
Important

The CC-Link dedicated cable and CC-Link dedicdated high-performance cable cannot be used together. If used together, correct data transmission will not be guaranteed.

Point

The shielded CC-Link dedicated cable should go through "SLD" and "FG" in each module, and both ends should be grounded (class-D grounding).SLD and FG are connected inside the module.

6. External Dimensions



unit: mm (inch)

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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